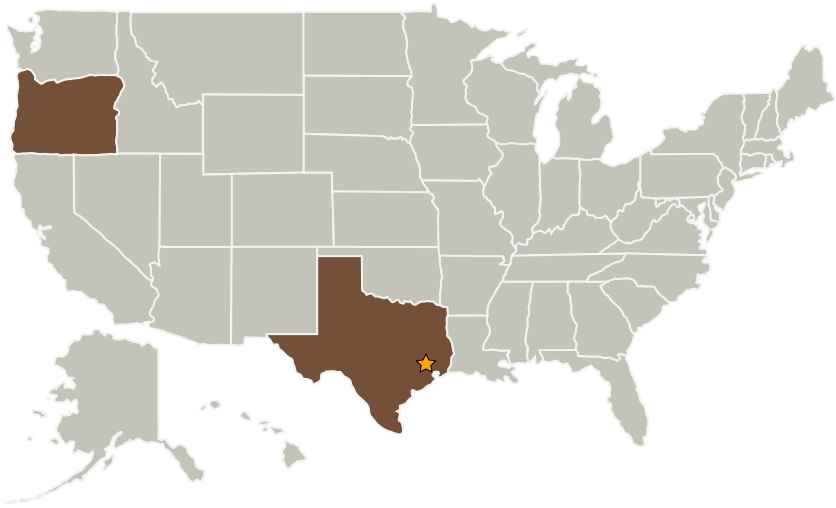
Nonhazardous Urine Pretreatment Method for Future Exploration Systems, Phase I

Completed Technology Project (2008 - 2008)

Project Introduction

A novel urine pretreatment that will prevent biological growth or chemical instabilities in urine without using hazardous chemicals is proposed. Untreated urine fosters biological growth, ammonia generation, creation of bio-solids, and inorganic precipitates, which foul water and air reclamation hardware. The current Russian system employs hexavalent chromium, a strong oxidant and carcinogen, and sulfuric acid to stabilize urine, while the American system utilizes potassium monopersulfate, another strong oxidant, sulfuric acid, and potassium benzoate. Urine stabilized in these respective manners requires triple and double containment, and chemical storage and handling become problematic due to the hazardous nature and low pH (1.3 -2.6) of these chemicals. These requirements significantly increase urine pretreatment ESM. The proposed pretreatment system consists of a simple flow-through Solid Phase Acid (SPA) bed containing sparingly soluble transition metal oxide particles for pH control, which combined with a soluble non-oxidizing biocide will provide long-term urine stabilization. This innovative system fulfills an unmet need for safe, efficient and automated urine pretreatment for current and future NASA missions. The Phase I effort will demonstrate the feasibility of this novel approach. The Phase II project will fully develop the process, including the design and testing of deliverable hardware for urine pretreatment.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Johnson Space Center (JSC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Johnson Space Center(JSC)	Lead Organization	NASA Center	Houston, Texas
UMPQUA Research Company	Supporting Organization	Industry	Myrtle Creek, Oregon

Primary U.S. Work Locations	
Oregon	Texas

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

James R Akse

Technology Areas

Primary:

- TX14 Thermal Management Systems
  - TX14.2 Thermal Control Components and Systems
    - TX14.2.3 Heat Rejection and Storage